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Genetics: Heredity and Adaptations

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UNDERSTANDING BY DESIGN

Unit Cover Page

Unit Title: **Genetics: Heredity and Adaptations**

Grade Level: **7**

Subject/Topic Area(s): **Science**

Designed By: **Alexander Serna-Wallender**

Time Frame: **30 days**

School District: **Northeast ISD**

School: **Jackson M.S.**

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Brief Summary of Unit (Including curricular context and unit goals):

By the end of this unit students will be able to distinguish the difference between offspring from asexual reproduction and sexual reproduction. Students will be able to describe how traits are passed from parent to offspring and the role that DNA and chromosomes play in the passage of inherited traits. This unit will also lead students to predict genetic outcomes using Punnett Squares. Using their knowledge of heredity students will then be engaged in exploring how the passage of genetic traits can change over time based on an organism's environment, through natural selection. Students will also be able to compare the difference between natural selection and artificial selection. Lastly, students will be able to describe common adaptations and the roles that they play in an organism's survival.

Unit: Genetics – 1) Reproduction, 2) Heredity, 3) Adaptations

Grade: 7

Length: 30 Days

Stage 1: Desired Results

Established Goals (Standards)

TEKS or Scope & Sequence

7.14 Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material. The student is expected to:

- (A) define heredity as the passage of genetic instructions from one generation to the next generation.
- (B) compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction; a
- (C) recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus.

7.11 Organisms and environments. The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. The student is expected to:

- (B) Explain variation within a population or species by comparing external features, behaviors, or physiology of organisms that enhance their survival **such as** migration, hibernation, or storage of food in a bulb; and
- (C) Identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding **such as** the Galapagos Medium Ground Finch (*Geospiza fortis*) or domestic animals.

7.12 Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. The student is expected to:

- (A) Investigate and explain how internal structures of organisms have adaptations that allow specific functions **such as** gills in fish, hollow bones in birds, or xylem in plants

Understandings

Students will understand that...

- Traits are passed from parent to offspring through reproduction.
- Genetic material (chromosomes/DNA) determines the traits that an organism can inherit.
- Over time populations of organisms adapt to their changing environment.

Essential Questions

Where do an organisms trait's come from?

How are traits determined?

Why do organisms try to fit into their environment?

Knowledge

Students will know...

- The difference between sexual and asexual reproduction and the difference between the resulting offspring.
- How traits are passed in sexual reproduction.

Skills

Students will be able to...

- Identify based on appearance and traits whether an organisms is the result of sexual or asexual reproduction.
- Use a Punnett Square to predict the possible outcome traits of an offspring.

- Where genetic information is stored and how it is transferred.
- How the process of natural selection occurs.
- The difference between natural selection and selective breeding.
- Common adaptations.
- How adaptations help organisms to survive.
- How adaptations develop over time due to natural selection.

- Determine adaptations an organism might needed based on a given environment.
- Uses chromosomes combinations to describe traits.
- Identify, based on graphics and/or text, if natural selection or selective breeding has taken place in a species.
- Explain orally or in writing how a species may contain variation within its population to enhance its survival.
- Compare organism's external features that enhance their survival.

Stage 2: Assessment Evidence

Performance Task:

Students will demonstrate their mastery of heredity and adaptations by choosing between four tasks, one that demonstrates their knowledge of each topic. For heredity they will have the option between interviewing a family member about traits that have been passed through their family or creating fictional parents and using Punnett Square to predict an offspring's traits. For adaptations they will have a choice between researching three real life animals and describing their adaptations or choosing a fictitious environment and creating an animal that would be well adapted to that environment.

See attached file...

Other evidence:

- End of Unit Test
- Exit Slip
- Mini –Assessments: 7.14B, 7.14A&C. 7.11B&C

Stage 3: Learning Activities

(Steps taken to get students to answer Stage 1 questions and complete performance task)

Day 1: Sexual vs. Asexual Reproduction

Pre-Assessment: Sexual vs. Asexual Reproduction Region 4 slip pg. 193.

Engage: Sexual vs. Asexual Reproduction Sort – Students will have to organize pictures into categories based on whether they are examples of sexual or asexual reproduction.

Engage: EduSmart 7.14B – As a class will watch the video clip, stopping to ask questions, do interactive, and have discussion as we begin to explore the different forms of reproductions.

Day 2: Asexual Reproduction

Explore: Microviewers: Asexual Reproduction – Students will examine various organisms undergoing asexual reproduction in microview slides.

Explain: Asexual Reproduction Foldbook – A four door foldbook looking at four of the most common types of asexual reproduction – binary fission, budding, vegetative propagation, regeneration.

Explain: Gateways Asexual Group Readings – As a table pairs student will read different descriptions of organisms undergoing asexual reproduction have to decide which type of asexual reproduction is occurring.

Day 3: Sexual vs. Asexual Reproduction

Evaluate: Asexual Reproduction Review Region 4. Pg 197,199

Explore: Inheritance Gizmo – Students will explore the difference between sexual and asexual reproduction in a simulation of alien offspring.

Explain: Venn Diagram Sexual vs. Asexual Reproduction – The teacher will lead students in a side by side explanation of the two types of reproduction.

Day 4: Fertilization

Evaluate: ID the Offspring – Given a series of parent and offspring pictures, students (with their table partners) will have to match the parent to the offspring and then decide if the offspring is a product of sexual or asexual reproduction.

Engage: Fertilization Brain Pop

Explore: Internal vs. External Fertilization Sort – With their table partner students will take a series of picture cards and attempt to sort them as either examples internal or external fertilization. Together they will need to come up with a justification for their sorting and then will share out with the class.

Explain: Internal vs. External Fertilization Foldbook – The teacher will lead student in construction a foldbook comparing the similarities and differences between internal and external fertilization.

Day 5: Fertilization and Sexual vs. Asexual Reproduction

Elaborate: Flower Pollination Gizmo – Students will do an online investigation looking at the various ways flowers can pollinate and reproduce.

Evaluate: Sexual vs. Asexual Reproduction Mini-Assessment – Students will answer a short, 5 question STAAR formatted assessment to evaluate their understanding of reproduction.

Day 6: Heredity

Pre-Assessment: Heredity Graphic Organizer – Region 4 pg. 191

Engage: Meet Me in the Middle – Teacher will have class stand around the edges of the room, and call out specific traits. Those students with the named trait will come meet the teacher in the middle. The teacher will then ask questions of students and talk briefly about frequency of traits.

Engage: Traits Video - Students will watch a video clip talking about various traits that have been based through the humans and how different regions of the world have populations with varying traits.

Day 7: Chromosomes and DNA

Explore: Virtual Lab: DNA Extraction – In an online simulation students will be guided through the process of taking a cheek cell sample and break the cell apart to then extract the DNA found inside. (<http://learn.genetics.utah.edu/content/labs/extraction/>)

Explore: Building DNA Gizmo - Students will explore how the various chemicals in DNA combine together inside a cell's Nucleus and then how enzymes cause the DNA to duplicate itself.

Day 8: Chromosomes and DNA

Explain: Tiered Reading: DNA → Traits: Students will be divided into groups based on readiness and be given one of four articles at different reading levels on how you go from DNA inside chromosomes to visible traits. After being given time to read their article students will then come together as mixed article groups and answer a series of questions about what they just read.

Explain: EduSmart 7.14 C - Students will go through a series of guided notes on the location of DNA and chromosomes and the role they play in heredity.

Evaluate: Exit Slip: Region 4. Pg 201

Day 9: Chromosomes and DNA

Elaborate: Girl or Boy – Using a series of X and Y chromosome cards students will explore the effects chromosomes have on determining gender.

Elaborate: Half of Each Investigation - Given a variety of chromosome sets students will look at the way various chromosome can combine to produce different traits in organisms.

Day 10: Heredity

Engage: Genetics Prezi and Mutations – Teacher will lead students through a presentation about various mutations can occur and then into some of the basic principles of genetic inheritance.
Explain: Genetics Vocabulary Fortune Teller - Students will use pictures and definitions to construct a “fortune teller” of key genetics vocabulary.

Day 11: Heredity

Explain: Probability and Genetics Reading: With their table partners students will need jigsaw the reading passage, and then explain the part that they read to their table partner. Then together they will answer a series of summary questions.

Explore: Create-a-Face - With their table partners students will flip a coin to determine the various genotypes of traits that their face will receive, they will then have an opportunity to draw and compare their creations.

Day 12: Heredity

Elaborate: Crazy Traits A2 – Students will have to coins representing the sperm and egg cells. They will flip these coins to determine the various traits given to their creature. They will need to identify the creatures genotype and corresponding phenotype, and then build their creation. We will then play a survival game to see which traits where the most beneficial.

Day 13: Punnett Squares

Engage: Harry Potter Genetics – The teacher will guide the class through a quick presentation on how Punnett Squares can be used to predict the outcome of magic in various characters in Harry Potter.

Explain: Punnett Square Handout- The teacher will guide students through how to use Punnett squares and predict the probability of traits in offspring.

Evaluate/Explore: Punnett Square Bears – Given a series of bear cards with different genotypes printed on them the students will manipulate the cards to work through predicting various outcome of genotype crosses.

Day 14: Heredity

Explore: Mouse Genetics Gizmo – Students will explore what happens when you cross white furred mice and black furred mice and the resulting outcomes of varying genotype and phenotypes.

Day 15: Heredity

Explain: Genetics Problems – The teacher will lead students through how to read and interpret genetics sentences. Then working with their table partners student will be given a series of genetic sentences in which the must interpret and then create a Punnett square for to predict offspring traits.

Elaborate: Bill Nye: Genetics - Students will watch a video clip hitting a variety about various topics in the study of genetics.

Day 16: Heredity

Evaluate: Reebop Babies – In table pairs students will be given a set of chromosome cards, using these chromosomes they will predict traits for their creature. They will then use their understanding of dominance in traits to build their creatures given the supplies on their desk.

Evaluate: Heredity Mini-Assessment – Students will answer a short, 5 questions STAAR formatted assessment to evaluate their understanding of heredity.

Day 17: Buffer Day

Day 18: Natural Selection

Engage/Explore: Natural Selection Gizmo – Students will explore how the color of tree bark affected the population sizes of various colored peppered moth and how over time populations can change.

Day 19: Adaptations and Natural Selection vs. Selective Breeding

Explain: EduSmart 7.11C – Students will go through a series of guided notes on what an adaption is and the difference between natural selection and selective breeding.

Explain: Adaption Vocabulary – Using Marzano’s boxes, students will work with their table partners

to define key adaptations vocabulary, draw a picture, and come up with a definition in their own words or another way of remembering the word.

Explain: Natural vs. Artificial Selection T-Chart – The teacher will guide the students in comparing and contrasting natural and artificial selection.

Day 20: Natural Selection

Explain: Beak of a Finch Reading – Students with their table partner will read an article about the various finches' beak adaptations found in the Galapagos islands.

Explore: Bird Beak Investigation – In groups of four, students will given various tools to simulate different bird beaks, they will then go hunting for food. After the hunt they will talk about how the type of food available effected their survival and how their different beaks were adapted for different food sources.

Day 21: Natural Selection vs. Artificial Selection

Elaborate: Finch Evolution and Harvest of Fear – Students will participate in two online investigations. One looks at the evolution of finches over time based on their environment and the second explore genetically modifying crops based on desired yield and location. (Finch - <http://www.pbs.org/wgbh/evolution/darwin/origin/index.html>) and (Crops - <http://www.pbs.org/wgbh/harvest/engineer/select.html>)

Day 22: Natural Selection vs. Artificial Selection

Elaborate: Evolution: Natural and Artificial Selection Gizmo – Students will explore how the environment can effect an organisms survival, put all the role that human intervention in chromosomes can effect an organisms.

Day 23: Adaptations

Engage: Camel Adaptations Song – (<http://www.youtube.com/watch?v=YX8VQIJVpTg>)

Explore: Crazy Traits A5 – Given a specific environment students will have to construct their create using the crazy trait pieces, describing along the way its geno and phenotypes. At the end of class we will play the creature survival game to see which creatures might be best adapted to their environment.

Day 24: Adaptations

Engage: Waves in Nature Adaptations Clip – Students will watch a clip talking about how animals have adapted to use light and sound waves both as tools and weapons.

Explain: Animal Adaptations Articles – The class will be divided into three groups. Each group will be reading a different article discussing various animal adaptation. After being given time to read their article they will fill in the chart about what he advantage of their adaptations are. Then students will get into groups of three (one from each article group) and share about their adaptations while the other members of their groups are completing their charts.

Day 25: Adaptations

Explain: EduSmart 7.11B & 7.12A - As a whole group the class will watch two brief clips discussing the need for adaptations and the difference between structural and behavioral adaptations.

Explain: Adaptation T-Chart – The teacher will guide students through the difference between structural and behavioral adaptations.

Elaborate: Animal Adaptations Webquest – Students will explore different animal adaptations based on their environment. (http://www.uen.org/utahlink/activities/view_activity.cgi?activity_id=4750)

Day 26: Adaptations

Elaborate: Bill Nye Evolution: – Students will watch a clip talking about how animals have changed over time based on their environments.

Evaluate: Adaption Mini-Assessment – Students will answer a short, 5 questions STAAR formatted assessment to evaluate their understanding of adaptations.

Review: Numbered Heads test review.

Day 27: Test Review

Review: Students will be paired up with students from Mrs. Michaleks class and work on a rotating review around the library.

Day 28: Test

Day 29: Performance Assessment

Explain: Introduce Performance Assessment

Evaluate: Performance Assessment - Students will have time to work on their performance assessment in class.

Day 30: Performance Assessment

Evaluate: Performance Assessment - Students will have time to work on their performance assessment in class.